

Organisms as indicators

Healthy streams have low levels of contaminants and contain a diversity of plants and animals. Certain mussels and insect larvae (caddisfly, stonefly, mayfly) are often used as indicators of good water quality, similar to the coal mine canaries used to detect poisonous gases. Since these mussels and larva can live only in relatively clean water, their presence usually indicates that problems are few in that section of the stream. Students and adult volunteers are monitoring watershed health in Kentucky by observing these indicators through the Kentucky Water Watch program.



Mayfly
Lew Kornman

Riparian area

Stream banks and the land along them are called a riparian area. With appropriate vegetation, riparian areas provide natural protection from pollutants that drain off the land. Good riparian management can prevent erosion and flooding. It also provides important habitat for wildlife because it offers food, water, shelter and a travel corridor.

How do we determine watershed health?

Healthy watersheds produce clean water – water that is fishable, swimmable and suitable as a drinking water source. Watersheds that meet these criteria support a wide variety of aquatic life and are a valuable resource. State agencies mostly follow the guidelines in the federal Clean Water Act to determine whether or not the quality of river and stream water is acceptable. Under the Clean Water Act, states set standards for the water based on how it is being used. These uses can consider the high-quality values of a wild and scenic river, a stream's importance as a drinking water source, wildlife habitat, or other uses. The standards include benchmarks for various *parameters* like dissolved oxygen, temperature, acidity, and other measurable qualities.

If a lake, river or stream meets the standards for fishing swimming, and drinking water sources, it *fully supports* its designated use (see map, centerfold). If it falls short on a few measures, it may only *partially support* its use. Failure on additional counts can mean that it is *not supporting* its designated use. Bodies of water that do not support their use must have cleanup plans that identify and quantify the problem pollutants and specify how they will be reduced. Sometimes the pollutants come from sewage treatment plants, other times they are carried into the water by runoff from towns, farms, new developments, or other areas.

Watershed health means more than good water chemistry. In addition to chemical analyses, watershed health can be measured by observing plant and animal life. For example, certain species are *indicators*. Also, habitat is important to watershed and stream health. Vegetation in the riparian area - especially shrubs and trees - provides food and cover for terrestrial and aquatic life.

While state officials have information from samples collected on the Licking River and a few of its tributaries, most of the water in the basin has not been tested. An interagency workgroup is coordinating to increase the amount of monitoring conducted in the region. By working together, tax dollars can be stretched and better information provided on the condition of the watershed. Also, citizens active in the Licking River Watershed Watch have collected data to supplement public agency information and raise public awareness. Efforts are underway to secure greater involvement from high schools, public universities and civic groups for long-term citizen monitoring in the region. Further testing may reveal other problem areas that need attention. Reducing concentrations of pollutants that exceed state standards will involve a considerable amount of co-operative action and analysis.

Kentucky Water Quality Standards

The following *parameters*, or measurable criteria, are only a few of those being used to define Kentucky's water quality standards. The standards and units for each parameter are listed below. For example, if a water sample shows more than 400 fecal coliform CFUs in a 100 milliliter sample, the water would be considered contaminated.

Parameter	Value	Units
Dissolved Oxygen	>4.0	Milligrams per liter (parts per million)
pH (measures acidity)	6-9	Standard units (7.0 = neutral)
Fecal coliform	400	Colony-Forming Units per 100 milliliters of water
Temperature	89	Degrees Fahrenheit

What are the water quality problems in the Licking River?

According to studies conducted over the past five years, the most common problems in the Licking River are nutrients, bacteria and sediments. Nutrients come from farm and residential fertilizers, livestock manure, faulty septic systems, and other sources. The phosphorus and nitrogen – nutrients – in fertilizers, manure and sewage cause algae to grow in the water. When the algae dies, it is decomposed by bacteria that use up the dissolved oxygen in the water. The loss of oxygen can cause fish to suffocate and die. Other bacteria – including some that may cause diseases in humans – can enter the water from inadequate septic systems, livestock manure or sewage plants and sewer lines that are bypassed or leak during heavy rains. These bacteria and the viruses and other germs that often accompany them pose a disease threat to swimmers, boaters and anglers. Sediment in the water causes muddy or cloudy conditions, interferes with fish reproduction and feeding, increases drinking water filtration costs, and generally degrades habitat. Sediment comes from poor farming, logging, development, and home building practices and stream bank erosion.

Other problems in the region come from clearing away vegetation on stream banks, straightening creek channels, undersized or poorly operated sewage treatment plants, and some industrial plants. Clearing trees and other vegetation from streams and straightening them is often done to reduce flooding, but usually only moves the floodwaters downstream and makes the situation worse elsewhere. In addition, removing trees that shade creeks and streams causes the water to become warmer, laden with algae and less suitable for fish and other organisms. It also causes streambank erosion, which can create further loss of land and add sediment to streams. Bacteria in the water means that sewage collection pipes and treatment plants in some areas need to be upgraded, along with some industrial wastewater treatment plants.

According to the Kentucky Division of Waste Management, there are many sites in the Licking River region that are contaminated or may be contaminated due to the presence of: underground storage tanks; hazardous waste facilities; landfills closed before July 1992; illegal dumps; and large tire piles, brine wells, or straight pipes.

Dealing with water quality issues will take education, time, conscious change in human habits, and financial support

